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## **Cell-to-cell contact modulates *Starmerella bacillaris* early death in mixed fermentations with *Saccharomyces cerevisiae* in a couple-dependent way**

**AIM:** The diversity and complexity of the fermentation ecosystem during wine making limits the successful prediction of wine characteristics. The use of selected starter cultures has allowed a better control of the fermentation process and the production of wines with established characteristics.

Among them, the use of mixed fermentations with *Starmerella bacillaris* and *Saccharomyces cerevisiae* yeasts has gained attention in recent years due to the fructophylic nature of the first and the ability of this inoculation protocol to reduce the acetic acid and ethanol content of the wines. The yeast species interact throughout the alcoholic fermentation and influence the chemical composition of the wines. Many studies have been carried out to gain an insight to the nature of these interactions, with the aim to better control the wine fermentation.

**METHODS:** In order to understand the population kinetics of *Starm. bacillaris* in mixed fermentations with *S. cerevisiae* and to investigate the effect of physical separation of the two species during fermentation, several experimental setups were employed. Importantly, double-compartment fermentation was carried out to elucidate the role of cell-to-cell contact in the death of *Starm. bacillaris* occurring during mixed fermentations. Furthermore, several strains of both *Starm. bacillaris* and *S. cerevisiae* were used, in order to get an insight into these interactions.

**RESULTS:** The early death of *Starm. bacillaris* in mixed fermentations in flasks as compared to the double-compartment fermentor, seemed to be not due to nutrients depletion or to the presence of toxic compounds, but most likely due to cell-to-cell contact induced inhibition. Nevertheless, the early death behavior as well as the extension of viability of *Starm. Bacillaris* in the double-compartment fermentor, depended on the individual strains of the two species tested and their combinations in couples during fermentation. These results lead to the hypothesis that the cell-to-cell contact mechanism depends greatly on the couple *Starm. bacillaris* and *S. cerevisiae* used to conduct the fermentation process.

**CONCLUSIONS:** In the future it will be necessary to make further studies in order to better investigate this aspect and to define with greater clarity how cell-to-cell contact mechanism happens and how it is regulated to be able to perform fermentations with different strains combinations and obtain wines with specific characteristics.

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